**The 3rd Intelligent Systems and Machine Learning Research Workshops**

**March 25, 2022**

**Organized by: FST ISML Research Cluster**

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| **Time(MST)** | 13:30pm-14:15pm |
| **Presenter** | **Dr. Junye Wang** |
| **Title** | **Water Resources and Water Quality Assessment Using Artificial Intelligence** |
| **Abstract** | In a river basin, the water quality and water resources are of considerable significance. The traditional modelling methodologies are dependent on datasets that involve large amount of unknown or unspecified input data. Artificial intelligence provides a flexible mathematical structure to enable identifying non-linear and complex relationships between input and output data. Here, some typical datasets are briefly introduced in monitoring water resources and water quality, such as time series data, spatially sparse data, image data by remote sensing. Then, several machine learning algorithms are used for water quality analysis and assessment. Finally, I discuss advantage and limitations of machine learning approach in water quality analysis, compared to process-based modelling.   |
| **Presenter’s short bio** | Dr. Junye Wang is a Full Professor at Athabasca University, Canada. He received his M.Sc. degree in thermo-physics from Harbin Shipbuilding Engineering Institute, Ph.D. degrees in chemical and mechanical engineering from East China University of Science and Technology in 1989 and 1996, respectively. Then he joined Shanghai Jiaotong University as an associate professor in 1996. From 1999 till 2013 he worked at the Universities of Sheffield, Greenwich, and Loughborough, and Scottish Crop Research Institute, and Rothamsted Research, the UK, as a research associate, research scientist, and principal research scientist, respectively. Dr. Wang has over 30 years’ experience in multi-scale and multidisciplinary modeling and is an internationally recognized leader in energy, environment and sustainability. He has authored/co-authored over 120 refereed journal papers and book chapters and serves as associate editor and editorial board member on several international journals. He is also a reviewer of papers for over 120 international journals.  |

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| **Time (MST)** | 14:15pm-14:45pm |
| **Presenter** | Dakota Soares |
| **Title** | A Hoeffding Decision Tree Based Approach for Soil Classification |
| **Abstract** | Soil classification is an important but challenging problem for the re-search community. As such, current solutions for classifying soil for a wide variety of reasons are out of the reach of hobbyists and the small research firms. This research study focuses on comparing various machine learning algorithms on a custom database generated from Canadian System for Soil Classification (CSSC) attributes to reveal a solution for identifying a soil Pedon. Discussion centres around acquainting the user with soil terminology, current solutions to the problem of soil classification, and the proposed solution. A database using these attributes was constructed, and six algorithms were analyzed using validation, test case, and 70-30 split testing via WEKA. Among the comparing algorithms, the Hoeffding decision tree was found to perform best, and it was subsequently used in developing a simple prototype using Java Graphical User Inter-face (GUI). Finally, the Hoeffding decision tree was compared to the other algorithms that were used to see why it was more accurate than its competitors. |
| **Presenter’s short bio** | Dakota Soares is a graduate of Athabasca University’s Bachelor of Science in Computing and Information Systems. He was the first student at AU to add the (then new) geoscience minor to his CIS major. Dakota graduated from Athabasca in 2021 and works as a Professor in the School of Information Technology at Fanshawe College teaching web-server application development and object-oriented design and analysis in C++. In addition, Dakota works as a backend server application developer for Alink Computer Solutions, a division of A & L Canada Laboratories, a laboratory that provides analytical services for soil, plant tissue, feed, fertilizer, and water across the US Midwest and Canada. |

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| **Time (MST)** | 14:45pm- |
| **Presenters** | **All** |
| **Title** | Discussions on cluster activity planning, et al. |
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Notes:

(1) the workshop will be recorded.

(2) The ISML research cluster is seeking talks for monthly ISML workshops! Anyone interested in sharing their ideas, research results, or best practices is asked to submit a presentation item including:

* the title of the presentation
* the name(s) and short bio(s) of the presenter(s)
* a brief description (about 100 words) about the presentation
* the preferred month for the presentation.

We accept presentations year-round, and welcome suggestions for speakers + topics, too. When submitting a talk item, you can choose to submit for the upcoming workshop, or any future workshops. If you submit for your talk item for the upcoming workshop, please submit it no later than one week (7 days) before the workshop date of the month (i.e., last Friday of the month). All items related to IS and ML will be scheduled for presentation according to the earliest timeslot availability. The researchers in the cluster are welcome to invite their research assistants or fellow researchers to co-present their work. Please submit your talk items to the ISML cluster coordinator Dr Oscar Lin at oscarl@athabascau.ca